

5. The semiconductor device according to claim 4, wherein said sidewall film includes

a first film directly formed only at an upper portion of said side surface of said gate, and

a third film covering said first film to form the cavity only at a lower portion of said side surface.

6. The semiconductor device according to claim 1, wherein a part of a side wall lower portion of said gate is removed to have said low permittivity region formed into a notched shape.

7. The semiconductor device according to claim 6, wherein said low permittivity region is made of a lower permittivity material as compared to said sidewall film.

8. The semiconductor device according to claim 6, wherein said low permittivity region is a cavity.

9. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:

forming a thin first film covering a side surface of said gate;

removing only a lower portion of said first film;

locally filling only a lower portion of the side surface of said gate, at which said first film is removed, with a low permittivity material; and

forming a second film on said first film to cover said low permittivity material.

10. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:

forming a thin first film covering a side surface of said gate;

removing only a lower portion of said first film; and

forming a second film on said first film with low step coverage, to thereby form a cavity at a lower portion of the side surface of said gate.

11. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:

removing a part of a side wall lower portion of said gate to process it into a notched shape;

locally filling only said part with a low permittivity material; and

forming a sidewall film on a side surface of said gate to cover said low permittivity material.

12. A method for manufacturing a semiconductor device including a gate, a source, and a drain, said method comprising the steps of:

removing a part of a side wall lower portion of said gate to process it into a notch shape; and

forming a sidewall film on a side surface of said gate with low step coverage to such an extent as not to fill in said part, to thereby form a cavity at a lower portion of the side surface of said gate.

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